

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>5</sup> :  A61F 13/15	A1	(11) International Publication Number: WO 94/10953  (43) International Publication Date: 26 May 1994 (26.05.94)
<p>(21) International Application Number: PCT/SE93/00971</p> <p>(22) International Filing Date: 15 November 1993 (15.11.93)</p> <p>(30) Priority data: 9203445-3 17 November 1992 (17.11.92) SE</p> <p>(71) Applicant (<i>for all designated States except US</i>): MÖLN- LYCKE AB [SE/SE]; S-405 03 Göteborg (SE).</p> <p>(72) Inventors; and</p> <p>(75) Inventors/Applicants (<i>for US only</i>) : WIDLUND, Urban [SE/SE]; Pärönvägen 5, S-435 43 Mölnlycke (SE). ÖS- TERDAHL, Eje [SE/SE]; Rödingsgatan 13, S-421 58 Västra Frölunda (SE). HANSSON, Roy [SE/SE]; Ale- gårdsgatan 112, S-431 45 Mölndal (SE). KOLAR, Milan [SE/SE]; Saturnusvägen 36, S-854 68 Sundsvall (SE).</p>		<p>(74) Agents: BERG, S., A. et al.; H. Albihns Patentbyrå AB, Box 3137, S-103 62 Stockholm (SE).</p> <p>(81) Designated States: AU, CA, CZ, FI, HU, JP, NO, NZ, PL, SK, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Published <i>With international search report. With amended claims.</i></p>
<p>(54) Title: A METHOD FOR THE MANUFACTURING OF AN ABSORBENT STRUCTURE AND AN ABSORBENT AR- TICLE FOR BLOOD ABSORPTION COMPRISING AN ABSORBENT STRUCTURE MANUFACTURED AC- CORDING TO THIS METHOD</p> <p>(57) Abstract</p> <p>A method for the manufacturing of an absorbent structure in an absorbent article, such as a sanitary napkin, tampon, pan- ty protector, wound or sore dressing and like articles is produced by using absorbent material in roll form directly in the product without first defibrating the material and then forming a mat. The material possesses good dispersion properties and swelling properties, which are meaningful to the function of the product. A high surface dryness is obtained, among other things. In addi- tion to cellulose fibres, the absorbent structure may also include superabsorbent material and/or binding fibres, among other in- gredients. The pulp mat is very thin, therewith obviating the need to compress the mat further in the product. In the case of cer- tain product applications, the material is softened mechanically prior to its use as an absorbent material.</p>		

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	CB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LJ	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TC	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

A METHOD FOR THE MANUFACTURING OF AN ABSORBENT STRUCTURE AND AN ABSORBENT ARTICLE FOR BLOOD ABSORPTION COMPRISING AN ABSORBENT STRUCTURE MANUFACTURED ACCORDING TO THIS METHOD.

Background

The present invention relates to a method for manufacturing of an absorbent structure in an absorbent article, such as a sanitary napkin, a tampon, a panty protector, a wound or sore dressing and like articles.

Many different types of absorbent articles of this kind are known to the art. The absorbent bodies of such articles are typically produced by dry-defibering and fluffing cellulose pulp in roll, bale or sheet form for instance, to form a pulp mat, sometimes admixed with so-called superabsorbent material in the pulp mat, these absorbents being polymers which are capable of absorbing many times their own weight of water or body fluid.

The pulp body is often compressed so as to enhance its fluid-dispersion ability and also in order to reduce pulp body bulk and therewith obtain an article which is as compact as possible.

The absorbent body may also include other constituents, for instance constituents which will improve its fluid-aquisition properties or its fluid-wicking properties, or which will increase its coherent strength, i.e. its coherency, and its ability to withstand deformation in use.

One serious drawback with products of this nature is found in the total absorption capacity of the articles and also in the fact that the articles will often leak long before their total absorption capacity has been fully utilized. Among other things, this is because the body fluid discharged by the wearer is unable to penetrate into the absorption material and to spread to hitherto unused areas of the article quickly enough, but instead leaks from the sides, of the sanitary napkin or the wound dressing. The ability of the materials used in the article to disperse the

absorbed fluid throughout the entire absorbent body is thus highly important.

Another problem resides in so-called rewetting, i.e. the transference of body fluid that has already been absorbed back into contact with the wearer's skin as a result of external forces, for instance when the wearer sits down. It is generally desired that the surface of the article that lies proximal to the wearer in use will remain as dry as possible.

Another desideratum with regard to the majority of hygiene products is that the article shall be thin, so that it can be worn as discretely as possible.

A very large part of the production plants used in the manufacture of the aforesaid hygiene articles is comprised of defibrating equipment, pneumatic conveying systems and mat-forming equipment. This equipment is also the source of serious faults in the production plants. Equipment for compressing the finished pulp mat or the finished hygiene product is furthermore often included downstream of the production plants.

It is known from International Patent Application WO 90/05808 to produce a pulp web by dry-forming, which is later defibered, so-called dry-formed roll or reel pulp. Flash-dried paper-pulp fibres, which may consist of thermomechanical pulp, chemi-thermomechanical pulp, CTMP, or chemical paper pulp, sulphite or sulphate pulp with a dry solids content of about 80% is delivered by means of an air stream in a controlled flow to a forming head arranged above a forming wire and there formed into a web that has a surface weight of 300-1500 g/m<sup>2</sup> and a density of 550-1000 kg/m<sup>3</sup>. Air is sucked away through a suction box placed beneath the wire. The moisture content in the process shall be 5-30%.

The web is pre-pressed to a density of 550-1000 kg/m<sup>3</sup> in order to slightly reduce the bulk of the web prior to the final pressing stage. The pressed web has a mechanical strength which enables the web to be rolled-up or handled in sheet form for storage and transportation purposes. The web can be readily defibered and is intended to be

converted into fluff for use in the manufacture of absorbent bodies or pads for diapers, sanitary napkins and like articles.

Another method for the manufacturing of an absorbent structure is described in European Patent 0 122 142, where a mixture of hydrophilic fibres and water insoluble particles of insoluble hydrogel is airlaid into a web and compressed to a density of 0.15 to about 1.0 g/cm<sup>2</sup>. This method however comprises several production steps, where the dry lap base material is first disintegrated into cellulose fibres by use of a hammer mill, whereafter the fibres are deposited on a screen surface and formed to the absorbent structure, which is then compressed. These manufacturing steps make this process rather complicated and expensive.

### Summary of the Invention

The object of the present invention is to provide in an absorbent article of the aforescribed kind an absorbent structure which exhibits extremely good absorption properties, both with respect to its ability to quickly take up fluid and also with respect to its ability to spread fluid throughout the material. The material will preferably exhibit low rewetting tendencies as well as being capable of being made very thin. It is also desired to provide a simplified method of manufacturing absorbent articles of the kind defined in the introduction. These objects and desiderata are achieved with a manufacturing method in which particulate material comprising 30-100%, preferably at least 50% and most preferably at least 70% flash-dried cellulose fibres is dry-formed to a web with a surface weight of between 50-500 g/m<sup>2</sup> and compressed to a density of between 0.2-1.0 g/cm<sup>3</sup> and that the web without subsequent defibration and fluffing is incorporated as an absorbent structure in an absorbent article.

Non-defibered, dry-formed roll pulp has been found to be an extremely good absorption material and can be used directly as an absorbent material in hygiene articles, without being defibered. The material also has good fluid dispersion properties and swelling properties, which are meaningful to the function of the product. The pulp mat is very thin and therefore need not be further compressed in the product or article.

In the case of certain product applications in hygiene articles, it is convenient to soften dry-formed roll pulp prior to its use as an absorption material. The earlier mentioned good absorption properties, fluid wicking properties and swelling properties are not influenced by the softening process to any great extent. One method to soften an absorbent sheet is described in European Patent Application EP 0 360 472, where the compressed absorbent material is worked between partially cutting rollers and thereby gaining softness. This method however leads among other things to decreased strength in the softened material.

#### Brief Description of the Drawings

The invention will now be described in more detail with reference to a number of exemplifying embodiments thereof and also with reference to the accompanying drawings, in which:

Figure 1 illustrates the absorption properties of a dry-formed CTMP-material subsequent to being worked between rolls at different roll spacings. Conventionally formed and compressed pulp mats of CTMP-pulp and chemical pulp respectively were used as references.

Figure 2 illustrates the absorption properties of a dry-formed CTMP-material subsequent to being softened. Conventionally formed and compressed mats comprised of CTMP-pulp and chemical pulp respectively were used as references.

Figure 3 illustrates the absorption properties of an absorbent structure produced with dry-formed CTMP, both with and without a superabsorbent admixture. Conventionally manufactured pulp cores both with and without a superabsorbent admixture were used as references.

Figure 4 illustrates the respective rewetting of an unsoftened and a softened absorbent structure in connection with blood absorption which was produced with dry-formed CTMP in the core, both with and with-out a superabsorbent admixture.

Figure 5 illustrates rewetting of a completely absorbent article in connection with blood absorption which was produced from dry-formed CTMP in the core. Conventionally manufactured products of corresponding composition were used as references.

Figures 6-8 illustrate schematically the composition of various exemplifying embodiments of inventive absorbent articles.

Figure 9 illustrates the structure of a cross section of the material in unsoftened condition.

Figure 10 illustrates the structure of a cross section of the material in softened condition.

### Description of the Invention

As before mentioned, important properties of a material used in the manufacture of a hygiene article are its absorbent capacity, absorption rate, dispersion capacity, drainage capacity, retention capacity, rewetting, softness and smoothness.

The fluids concerned are menstruation blood, blood and fluid matter from wounds and sores.

The object of the present invention is to provide in an absorbent article such as a sanitary napkin, tampon, panty protector, wound or sore dressing and like articles, an absorbent structure which exhibits highly effective absorption properties, both with regard to its fluid-acquisition rate and its ability to disperse fluid throughout the material. The material will also preferably have low rewetting and be capable of being made very thin and smooth. It is also desired to simplify the manufacturing process. A finished absorbent material in roll form which can be used without needing to be defibered would partially reduce the need for the earlier mentioned defibering equipment, pneumatic conveying systems and mat-forming equipment, and consequently there is a demand for such material.

The aforesaid objects and desiderata have been achieved in accordance with the invention by including in the absorbent structure that is manufactured by a method in which particulate material comprising 30-100%, preferably at least 50% and most preferably at least 70% flash-dried cellulose fibres is dry-formed to a web with a surface weight of between 30-2000 g/m<sup>2</sup> and compressed to a density of between 0.2-1.0 g/cm<sup>3</sup> and that the web without subsequent defibration and fluffing is incorporated as an absorbent structure in an absorbent article.

In accordance with the invention, there is used a dry-formed product which is manufactured from particulate material as mechanical pulp or chemi-thermomechanical pulp (CTMP) or a corresponding product manufactured from sulphite pulp or sulphate pulp, so-called chemical cellulose pulp. Cellulose fibres which have been stiffened chemically may also be used. In the dry-formed product can also be included other



particulate matter as superabsorbents, thermoplastic binding fibres and other kind of fibres.

Non-treated dry-formed roll pulp has extremely good absorption, dispersion and swelling properties, and it has been found possible to use the material immediately as an absorption material in hygiene articles without defibrating the pulp. In the case of certain absorbent articles, it has been found suitable to soften the material slightly prior to its use. One method of softening the material is described below.

Dry-formed cellulose pulp can be produced, for instance, by forming a web of flash-dried paper pulp fibres in accordance with the method described in International Patent Application WO 90/05808.

Cellulose pulp fibres have a so-called curl value which defines the crookedness of the fibre. Curl value can be measured according to the method described by B.D. Jordan, N.G. Nguyen in Papper och Trä 4/1986, page 313.

#### Softening of the Material

The material can be given a softness which renders the material highly suitable for use as an absorption material in the majority of hygiene articles, by working dry-formed roll pulp between for instance corrugated rolls. The material can be brought to different degrees of softness for different product applications, by working the material between different types of rolls and at different roll spacings.

Dry-formed roll pulp which has been softened in this way exhibits very good product properties, and the earlier mentioned good absorption properties are not influenced by the softening process to any great extent.

The material is delaminated in the softening process as illustrated in figures 9 and 10. The unsoftened material has normally an even high density throughout the whole the thickness of the material (61). As a result of the softening process the material is delaminated so as to form a plurality of partially separated (63), thin fibre layers (62).

Softening and delamination of the material reduces its total density to some extent, although the original density is essentially retained in each individual layer. Because a very high density is retained in the individual layers, the good fluid wicking properties of the material are retained despite the increase in bulk obtained in conjunction with the softening process. The total bulk is increased by up to 300%, normally 1-100%, as a result of the softening process, depending on the method used and the extent to which the material is softened.

It will be understood that the aforesaid material softening method has been given solely by way of example and that corresponding results can be achieved with the aid of other methods. For instance, the material could eventually be softened by means of ultrasonic energy, microwaves, by moisturizing the material, or with the aid of chemical additives.

#### Investigation of Material Properties

The test equipment described below was used to evaluate absorption properties.

#### Method 1. Absorption Properties Up an Inclined Plane

A rectangular test body was punched from the material and a line was drawn transversely across the test body at a point 11 cm from one short end of the body. A fluid container was placed adjacent laboratory scales and both the scales and the container were adjusted to a horizontal position. A plexiglass plate was placed on the scales at a 30° slope, with one free edge of the plate extending slightly down into the container. A line had been drawn transversely across the plate at a point 11 cm from the lower edge of said plate. Test fluid (0.9% NaCl-solution) was poured into the container, until 20 mm of the plexiglass plate was located beneath the surface of the fluid. The test body was secured on the plexiglass plate so that the line drawn on the test body coincided with the line drawn on the plate while, at the same time, folding away the lower part of the test body so as to prevent it from coming into contact with the test liquid. A clock was started at the same time as the test body was laid onto the plate, with the test body

extended down into the solution to the same extent as the plate. The increase in weight of the test body with time was recorded.

#### Method 2. Measurements of Absorption Capacity and Degree of Utilization

A test product was secured in a fixture. Test fluid (0.9% NaCl-solution) was delivered to the wetting point of the product over a period of 60 minutes at the rate at which the fluid was absorbed. The amount of fluid absorbed was measured continuously and the total amount of fluid absorbed by the product constitutes the utilized absorption capacity of the test product. The test product was then placed in a fluid bath, in which it had the maximum opportunity of absorbing test fluid. The test product was then again weighed and the total absorption capacity calculated. The degree of utilization is given by the quotient between the utilized absorption capacity of the test product and the total absorption capacity.

#### Method 3. Determining Blood Absorption

A test body, 65 x 200 mm, was punched from the material. 5 ml test fluid (0.9% NaCl-solution) were delivered to the wetting point on the test body. Dispersion of the fluid was measured after about 30 minutes. A further 5 ml of test fluid (0.9% NaCl-solution) were then delivered to the wetting point and fluid dispersion was measured after about a further 30 minutes. Subsequent to the last delivery, eight filter papers were placed over the wetting point and loaded with a weight of 4.875 kg for 15 seconds. The filter papers were weighed both before and after applying the load and rewetting was recorded.

#### Test Results

##### Softening

With the intention of investigating how the material was affected at different softening roll spacings when softening the material, a material was tested under different softening conditions. For instance, in the case of a dry-formed CTMP-material having a surface weight of 900

g/m<sup>2</sup> and a density of 0.63 g/cm<sup>3</sup>, a suitable roll spacing is 1.7-2.4 mm during the softening process. The material is not influenced to any great extent at roll spacings which lie within this range. Figure 1 illustrates the absorption properties at different roll spacings. The results were determined in accordance with Method 1.

- A Material according to the invention, roll spacing 1.7 mm.
- B Material according to the invention, roll spacing 2.0 mm.
- C Material according to the invention, roll spacing 2.4 mm.
- D Material according to the invention, roll spacing 2.0 mm, softened twice.
- E Material according to the invention, roll spacing 2.0 mm, softened four times.
- F CTMP-pulp, density 0.125 g/cm<sup>3</sup>.
- G Chemical sulphate pulp, density 0.125 g/cm<sup>3</sup>.

#### Absorption Properties of Absorbent Structures

The absorption properties of an inventive CTMP-material having a surface weight of 900 g/m<sup>2</sup> and a density of 0.63 g/cm<sup>3</sup> compared with those of corresponding pulp cores produced from conventionally defibred and web-formed CTMP and corresponding chemical pulp are shown in Figure 2. In the absence of superabsorbent material, the absorption capacity is about 9 g of fluid for each gram of absorbent material. The results were determined in accordance with Method 1.

- A Material according to the invention.
- B CTMP-pulp, density 0.125 g/cm<sup>3</sup>.
- C Chemical sulphate pulp, density 0.125 g/cm<sup>3</sup>.

#### Admixing Superabsorbent Material

The presence of superabsorbent material in an absorbent body will influence the absorption properties of the body. Superabsorbent material can be incorporated in the absorbent body in different ways. For instance it may be admixed with the body material, laid in layers in the body, or disposed therein in some other way. This admixture of superabsorbent material can be effected in conjunction with manufacturing the dry-formed material, although it may also be effected during some other part of the manufacturing process. The

absorption properties were compared with an inventive CTMP-material to which no superabsorbent material had been added and also with corresponding pulp cores comprised of conventional defibred CTMP and chemical pulp. The results of this comparison are shown in Figure 3. The results were determined in accordance with Method 1.

- A Chemical sulphate pulp containing 30% superabsorbent and having a density of 0.125 g/cm<sup>3</sup>.
- B Inventive material containing 30% superabsorbent.
- C Reference diaper containing 30% superabsorbent.
- D Inventive material containing no superabsorbent.

#### Rewetting Measurements, Specific for Blood Absorption

In the case of blood absorption, products which comprised an inventive softened CTMP-material showed better rewetting values than non-softened products. The results also showed that when absorbing blood, products which lacked superabsorbent material exhibited lower rewetting values than material which contained superabsorbent material. Material which lacks superabsorbent material also disperses blood much more effectively. The results can be seen from Figures 4 and 5. The reference products comprised two different products frequently found on the market. The results were determined in accordance with Method 3. The prerequisites for this effect are that at least one layer of the pulp mat is free from superabsorbent material. Of course, this does not exclude the presence of such material in other parts of the absorbent article.

#### Figure 4

- A Inventive material 350 g/m<sup>2</sup>.
- B Inventive material 350 g/m<sup>2</sup>, softened.
- C Inventive material 350 g/m<sup>2</sup> + 5% superabsorbent.
- D Inventive material 350 g/m<sup>2</sup> + 5% superabsorbent, softened.

#### Figure 5

- A Reference product 1.
- B Reference product 2.
- C Product containing inventive material.

### Network Strength

Dry-formed roll pulp will normally have sufficient mat strength for the product applications intended here. If the network strength of certain product applications should be found insufficient, the network strength can be increased by reinforcing the structure in some suitable manner, by adding reinforcing fibres, binding fibres or binding agent to the cellulose fibre mixture. The network strength can also be increased by incorporating a reinforcing layer of, for instance, plastic, non-woven, net or threads in the absorbent structure, or by fastening a reinforcing layer or an outer sheet on one or both sides of the material.

### Density and Surface Weight

The softened pulp mat is still very thin, and consequently it is unnecessary in many cases to further compress the mat prior to its use in an absorbent article. A suitable density is 0.2-1.0 g/cm<sup>3</sup>, preferably 0.3-0.9 g/cm<sup>3</sup> and most preferably 0.6-0.8 g/cm<sup>3</sup>. A suitable surface weight is between 50-1000 g/m<sup>2</sup>, preferably 100-800 g/m<sup>2</sup> and most preferably 200-600 g/cm<sup>2</sup>. When calculating the density, the thickness of the material was measured with the aid of a Mitutoyo thickness meter.

### Description of a First Exemplifying Embodiment

Figure 6 illustrates an exemplifying embodiment of an inventive sanitary napkin. The napkin comprises conventionally an absorbent body 21 which is enclosed between a fluid-permeable top sheet 22, which is suitably comprised of perforated plastic film or like material and which lies proximal to the wearer in use, and a fluid-impermeable bottom sheet 23. A thin fluid-permeable layer 27, for instance of non-woven material, may be placed between the absorbent body 21 and the top sheet 22. The sheets 22 and 23 have parts which protrude beyond the absorbent body 21 and the sheets are mutually joined at these protruding parts. The bottom sheet 23 is comprised of a suitable plastic material, for instance polyethylene. It will be understood, however, that other known materials may be used for the top and the bottom sheets within the scope of the invention.

The absorbent body 21 is comprised of one single layer. This layer may consist of a dry-formed material according to the invention which contains from 0-10% superabsorbent material. A suitable density range in the case of the absorbent body 21 is 0.6-0.9 g/cm<sup>3</sup>, while a suitable surface weight is 200-300 g/m<sup>2</sup>. When the absorbent body is comprised of a CTMP-material or some other material having a yellowish or brownish colour, a covering layer of chemical pulp white in colour may be applied to the top of the absorbent body.

#### Description of a Second Exemplifying Embodiment

Figure 7 illustrates an exemplifying embodiment of an inventive tampon. The tampon is comprised of an inventive absorbent material which has been rolled to a cylinder-like form 31. In conjunction with rolling the absorbent material into its cylindrical shape, a string 38 is placed in the centre of the cylinder 31, in a conventional manner, and the cylinder 31 is compressed to the desired thickness and shape, in a conventional manner. Prior to being compressed and shaped, the absorbent material will suitably have a density range of 0.4-0.9 g/cm<sup>3</sup> and a suitable surface weight of 200-600 g/m<sup>2</sup>.

#### Description of a Third Exemplifying Embodiment

Figure 8 illustrates an exemplifying embodiment of an inventive wound or sore dressing. The dressing includes, in a conventional manner, an absorbent body 41 which is enclosed between a fluid-permeable top sheet 42, which is suitably comprised of a soft non-woven material, a perforated plastic film or the like, and which is intended to lie proximal to the wearer in use, and a fluid-repellent bottom sheet 43. The sheets 42 and 43 have parts which protrude beyond the absorbent body 41 and are joined together at these protruding parts. The bottom sheet 43 is comprised of a suitable fluid-repellent material, for instance a non-woven material that has been made hydrophobic. It will be understood, however, that the top and bottom sheets may comprise other known materials, within the scope of the invention.

The absorbent body 41 is comprised of only one single layer. This layer may consist of inventive dry-formed material and may be constructed with a relatively open fibre structure of relatively low density and with a superabsorbent content of 0-10%. A suitable density range in respect of the absorbent body 41 is 0.20-0.50 g/cm<sup>3</sup> and a suitable surface weight is 200-700 g/m<sup>2</sup>.

It will be understood that the invention is not restricted to the illustrated and described exemplifying embodiments thereof and that other embodiments are conceivable within the scope of the following Claims.



### Claims

- 1 A method for the manufacturing of an absorbent structure in an absorbent article, such as a diaper, sanitary napkin, tampon, panty protector, incontinence guard, bed protector, wound or sore dressing, saliva absorbent and like articles, characterized in that particulate material comprising 30-100%, preferably at least 50% and most preferably at least 70% flash-dried cellulose fibres is dry-formed to a web with a surface weight of between 30-1000 g/m<sup>2</sup> and compressed to a density of between 0.2-1.0 g/cm<sup>3</sup> and that the web without subsequent defibration and fluffing is incorporated as an absorbent structure in an absorbent article.
- 2 A method for the manufacturing of an absorbent structure according to Claim 1, characterized in that said web is compressed to a density of between 0.3-0.9 g/cm<sup>3</sup>, preferably 0.6-0.8 g/cm<sup>3</sup>.
- 3 A method for the manufacturing of an absorbent structure according to one or more of Claims 1 or 2, characterized in that the web in connection to the compression has a moisture content of between 3-20%, preferably between 4-18% and most preferably 11-16% calculated on the total weight of the web.
- 4 A method for the manufacturing of an absorbent structure according to one or more of the preceding Claims, characterized in that the web before being incorporated as an absorbent structure in an absorbent article, such as a sanitary napkin, tampon, panty protector wound or sore dressing and like articles is mechanically softened and therewith delaminated, so as to exhibit a plurality of partially separated thin fibre layers.
- 5 An absorbent structure intended for the absorption of blood characterized in that it has been manufactured according to the method claimed in one of more of Claims 1-4.
- 6 An absorbent structure according to Claim 5,

characterized in that the surface weight is between 100-800 g/m<sup>2</sup>, preferably 200-600 g/m<sup>2</sup>.

7. An absorbent structure according to Claims 5 or 6, characterized in that the cellulose fibres are mainly comprised of fibres of chemi-thermomechanically produced pulp.

8. An absorbent structure according to Claim 7, characterized in that the chemi-thermomechanical pulp fibres have a curl value of between 0.20 and 0.40.

9. An absorbent structure according to one or more of Claims 5-6, characterized in that the cellulose fibres are mainly comprised of fibres of chemically produced pulp.

10. An absorbent structure according to one or more of the preceding Claims, characterized in that at least an amount of the fibres are chemically stiffened cellulose fibres.

11. An absorbent structure according to one or more of the preceding Claims, characterized in that the structure includes reinforcing means, for instance binding agent, reinforcing fibres or thermoplastic binding fibres.

12. An absorbent structure according to one or more of the preceding Claims, characterized in that the structure includes a reinforcing layer of non-woven, tissue, plastic or net material for instance.

13. An absorbent article intended for the absorption of blood such as sanitary napkin, panty protector, wound or sore dressing and like articles comprising a liquid-permeable top sheet, an essentially liquid-impermeable bottom sheet, and an absorbent body enclosed between said sheets, characterized in that the absorbent body includes an absorbent structure according to one or more of Claims 5-12.

14. An absorbent article according to Claim 13,

characterized in that the absorbent article comprises an absorbent structure according having a surface weight of between 50-1000 g/m<sup>2</sup> and a density of between 0.20-1.0 g/cm<sup>3</sup>.

15. An absorbent article according to Claim 14, characterized in that the cellulose fibres are comprised mainly of fibres of chemi-thermomechanically produced pulp.

16. An absorbent article according to Claim 15, characterized in that the absorbent structure is covered with a layer of chemical pulp on one side thereof.

17. An absorbent article according to one or more of Claims 15-16, characterized in that at least an amount of the cellulose fibres in the absorbent structure are chemically stiffened cellulose fibres.

18. An absorbent article according to one or more of Claims 13-18, characterized in that the density of the absorbent structure is between 0.3-0.9 g/cm<sup>3</sup>, preferably between 0.6-0.8 g/cm<sup>3</sup>.

19. An absorbent article according to one or more of Claims 13-18, characterized in that the surface weight of the absorbent structure is between 100-800 g/m<sup>2</sup>, preferably between 200-600 g/m<sup>2</sup>.

20. An absorbent article according to one or more of Claims 13-19, characterized in that the absorbent structure comprises between 0-15% superabsorbent material, calculated on the total weight of the structure in a dry state.

21. An absorbent article according to Claim 20, characterized in that the absorbent structure contains no superabsorbent material.

22. An absorbent article intended for absorbing blood, such as a tampon or like article, characterized in that the article includes an absorbent structure according to one or more of Claims 5-12.

23. An absorbent article according to Claim 22,

c h a r a c t e r i z e d in that the absorbent structure is mainly comprised of fibres of chemi-thermomechanically produced pulp; and in that the article includes between 0-15% superabsorbent material, calculated on the total weight of the structure in a dry state.

24. An absorbent article according to Claim 23,  
c h a r a c t e r i z e d in that the absorbent structure contains no superabsorbent material.

## AMENDED CLAIMS

[received by the International Bureau on 15 April 1994 (15.04.94)  
original claim 1 amended; other claims unchanged (1 page)]

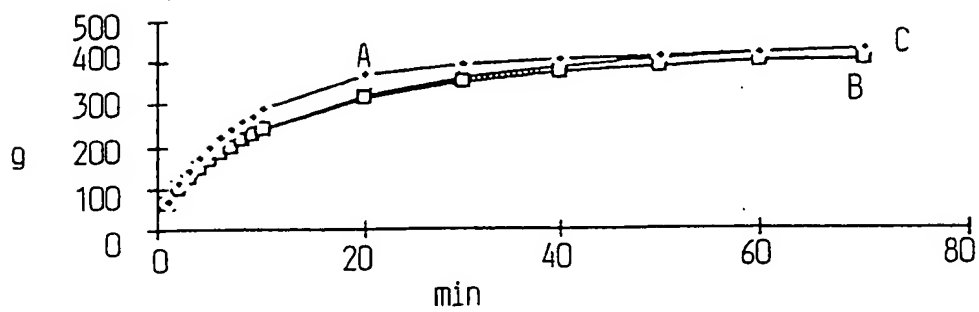
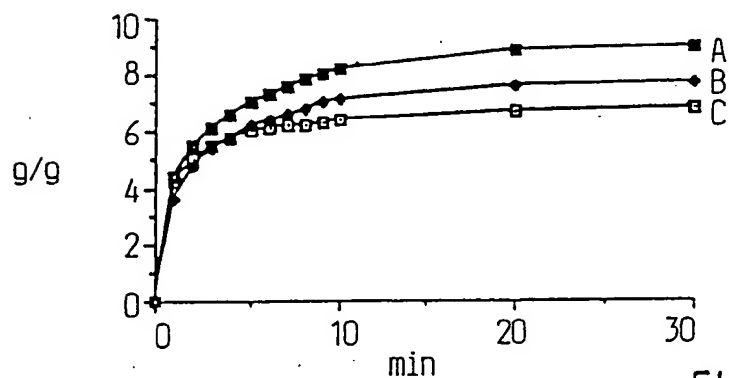
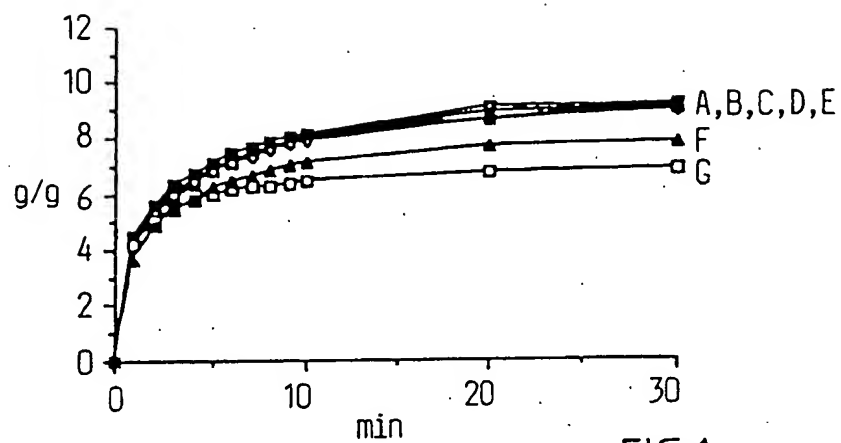
1 A method for the manufacturing of an absorbent structure in an absorbent article, such as a sanitary napkin, tampon, panty protector, wound or sore dressing and like articles, characterized in that particulate material comprising 30-100%, preferably at least 50% and most preferably at least 70% flash-dried cellulose fibres is dry-formed to a web with a surface weight of between 30-1000 g/m<sup>2</sup> and compressed to a density of between 0.2-1.0 g/cm<sup>3</sup> and that the web without subsequent defibration and fluffing is incorporated as an absorbent structure in an absorbent article.

2. A method for the manufacturing of an absorbent structure according to Claim 1; characterized in that said web is compressed to a density of between 0.3-0.9 g/cm<sup>3</sup>, preferably 0.6-0.8 g/cm<sup>3</sup>.

3. A method for the manufacturing of an absorbent structure according to one or more of Claims 1 or 2, characterized in that the web in connection to the compression has a moisture content of between 3-20%, preferably between 4-18% and most preferably 11-16% calculated on the total weight of the web.

4. A method for the manufacturing of an absorbent structure according to one or more of the preceding Claims, characterized in that the web before being incorporated as an absorbent structure in an absorbent article, such as a sanitary napkin, tampon, panty protector wound or sore dressing and like articles is mechanically softened and therewith delaminated, so as to exhibit a plurality of partially separated thin fibre layers.

5. An absorbent structure intended for the absorption of blood characterized in that it has been manufactured according to the method claimed in one of more of Claims 1-4.



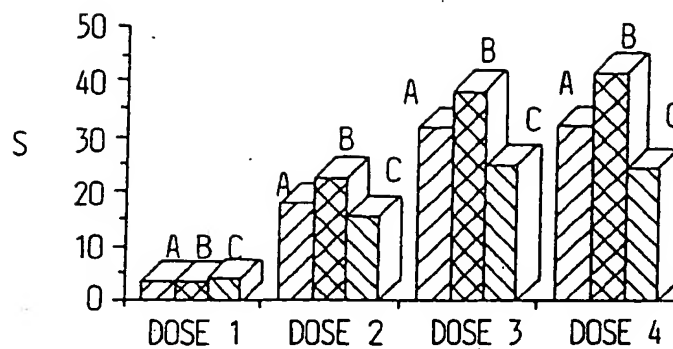


FIG. 4

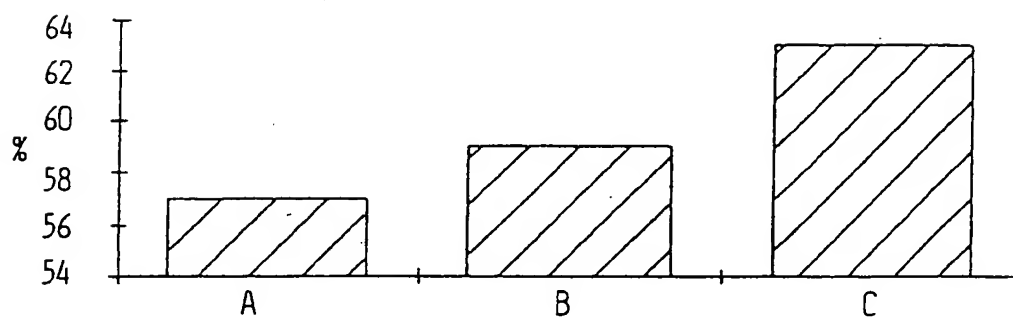


FIG. 5

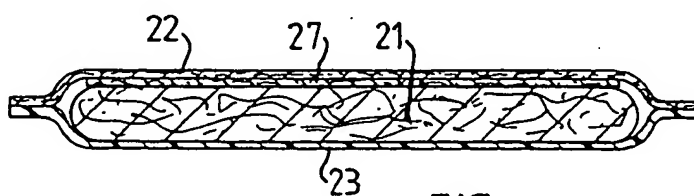
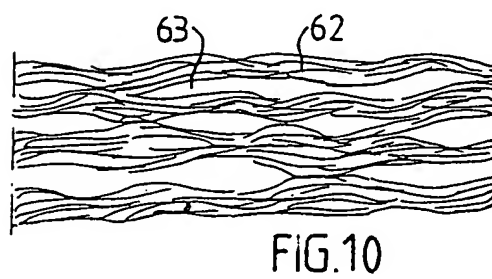
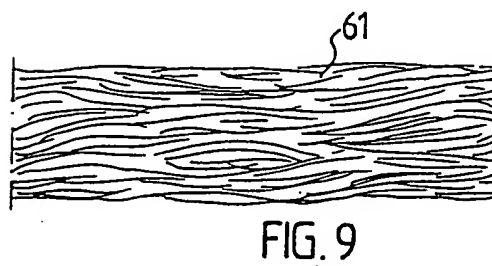
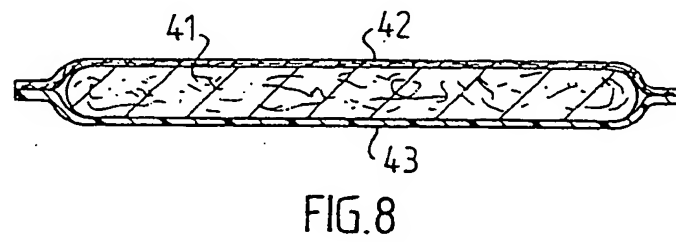
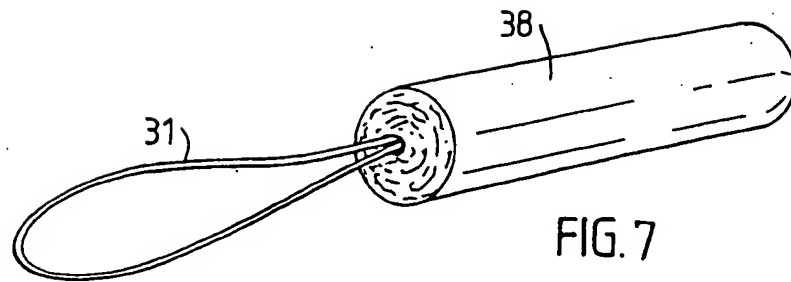


FIG. 6





PCT/SE 93/00971

## A. CLASSIFICATION OF SUBJECT MATTER

IPC5: A61F 13/15

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: A61F, D21H, D06C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO, A1, 9005808 (SCA PULP AB), 31 May 1990 (31.05.90) --	1-24
A	US, A, 4610678 (PAUL T. WEISMAN ET AL), 9 Sept 1986 (09.09.86) -- -----	1-24

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"B" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

23 February 1994

Date of mailing of the international search report

25 -02- 1994

Name and mailing address of the ISA/

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

Ingrid Falk

Telephone No. +46 8 782 25 00

28/01/94

International application No.  
PCT/SE 93/00971

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A1- 9005808	31/05/90	AU-B- 626941	13/08/92
		AU-A- 4516289	12/06/90
		CA-A- 2003087	17/05/90
		EP-A,B- 0444073	04/09/91
		SE-T3- 0444073	
US-A- 4610678	09/09/86	AU-B- 581842	09/03/89
		AU-A- 2540584	13/09/84
		CA-A- 1241570	06/09/88
		EP-A,B- 0122042	17/10/84
		SE-T3- 0122042	
		GB-A,B- 2140471	28/11/84